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EXAMINER	
BARTON, JEFFREY THOMAS	
ART UNIT	PAPER NUMBER
1753	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/773,343	SHARPS ET AL.	
	Examiner	Art Unit	
	Jeffrey T. Barton	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *37-73 and 86-111* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *37-73 and 86-111* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 21 December 2006 has been entered.

Response to Amendment

2. The amendment filed on 21 December 2006 does not place the application in condition for allowance.

3. The amendment improperly presents claims 90, 92, and 93. Claim 90 is truncated. (i.e. the words "semiconductor body" are omitted in the last line of the claim) Claim 92 does not show the changes made to the claim. (i.e. deleted limitations are not shown with a line through them) The status identifier for claim 93 is incorrect (i.e. it is "Previously Presented", not "Currently Amended"). Applicant is requested to correct such errors in the future.

Status of Rejections Pending Since the Office Action of 20 September 2006

4. The rejections of claims 45, 46, 49, 52, and 92 under 35 U.S.C. §112, 1st paragraph as pertains to limitations with "at least in part" language are withdrawn due to Applicant's amendment.

5. The rejection of claim 90 under 35 U.S.C. §112, 1st paragraph as pertains to the requirement that the top layer of the top cell has the same polarity as the bottom layer of the bypass diode is withdrawn due to review of the relevant portions of the specification.

6. The rejections of claims 47-49, and 90-92 under 35 U.S.C. §102(e) as anticipated by Boutros et al are withdrawn due to Applicant's amendment.

7. The rejections of claims 47-64 and 90-92 under 35 U.S.C. §103(a) as unpatentable over Boutros et al in view of Ho et al is withdrawn due to Applicant's amendment.

8. All other previous rejections are maintained.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 37-73 and 86-111 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 37, there is no support in the specification as originally filed for a bypass device having p-type, i-type, and n-type layers, wherein the bypass device and a subcell of a multijunction cell have an identical sequence of layers with substantially the same thickness and composition. The embodiment disclosed in figures 1-5 and paragraphs [0025]-[0052] teaches no intrinsic layer in the bypass device, while the embodiment disclosed in figures 6-9 and paragraphs [0053]-[0077] does not disclose that the bypass device (622-624-626) can have a sequence of layers identical to any subcell of the multijunction cell. There is no teaching of a p-i-n cell anywhere in the specification as filed. The same grounds apply to claims 38-46.

In claim 37, at line 6, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 38-46. The same grounds apply to claims 38-46.

In claim 47, at lines 11-12, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 48 and 49.

Regarding claim 50, there is no support in the specification as originally filed for a bypass device disposed on a sequence of layers in the second region, wherein the bypass device and a subcell of a multijunction cell have an identical sequence of layers with substantially the same composition and thickness. The embodiment disclosed in figures 1-5 and paragraphs [0025]-[0052] does not teach the claimed sequence of

layers supporting the bypass diode, while the embodiment disclosed in figures 6-9 and paragraphs [0053]-[0077] does not disclose that the bypass device (622-624-626) can have a sequence of layers identical to any subcell of the multijunction cell, or with the same thickness or composition. The same grounds apply to claims 51-64.

In claim 50, at line 12, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 51-64.

In claim 65, at lines 15-16, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 66-73.

In claim 86, at line 15, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 87-89.

In claim 90, at lines 9-10, the range of "at least one layer" for the bypass diode is not supported by the specification, as originally filed. The same applies to dependent claims 91 and 92.

In claim 90, at lines 13-14, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 91 and 92.

In claim 93, at lines 14-15, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 94-99.

In claim 100, at lines 16-17, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 101-106.

In claim 105, there is no teaching of a bypass diode comprising n- and p-type GaAs layers in an embodiment wherein the identical sequence of layers forms a bypass diode in the second region (i.e. the embodiment of Figures 1-5 and paragraphs [0025]-[0052].

In claim 107, at lines 16-17, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 108-111.

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 37-73 and 86-111 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 37, at line 6, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 38-46.

In claim 47, at lines 11-12, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 48 and 49.

In claim 50 at line 11, there is no antecedent basis for "the bypass device". The same applies to dependent claims 51-64.

In claim 50, at line 12, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 51-64.

In claim 65, at lines 15-16, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 66-73.

In claim 86, at line 15, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 87-89.

In claim 90, at lines 13-14, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 91 and 92.

In claim 93, at lines 14-15, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 94-99.

In claim 100, at lines 16-17, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 101-106.

In claim 107, at lines 16-17, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 108-111.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. Claims 93, 95-98, 107, and 110 are rejected under 35 U.S.C. 102(e) as being anticipated by Boutros et al, U.S. Patent 6,635,507.

As seen in Figure 8, and with respect to independent claims 93 and 107, Boutros et al teaches a multijunction solar cell comprising a Ge substrate (802); a first region including the N and P GaAs layers (804) which form a first junction of the multijunction solar cell and the N and P GaInP layers (806) which form a second junction of the multijunction solar cell, wherein this first region includes the portion of said N and P GaAs layers (804) and the portion of the N and P GaInP layers (806) not directly below, but to the right of the GaAs cap layer. In a second region, the portions of corresponding

N and P GaAs layers (804) and N and P GaInP layers (806) directly below the GaAs Cap support the bypass diode (810) to protect the cell against reverse biasing (see also col. 1, lines 16-22; and col. 7, lines 47-65). With respect to claims 93 and 107, these claims require that the top layer of the top cell has a first polarity and that the bottom layer of the bypass diode has the first polarity. In Figure 8, it is the Examiner's position that the GaAs N^{++} layer can be considered to by the lower layer of the bypass diode, and thus, has the same polarity as the upper N-type GaInP layer of the upper solar cell. Indeed, as seen in Boutros et al's Figures 2A, 3A, and 4A, the bottom layer of the bypass diode (210, 310, 410) is N^{++} and is the same polarity, i.e., N-type, as the top layer (208, 308, 408) of the solar cell. With respect to claims 97 and 107, when the GaAs P^{++} layer is considered the lateral conduction layer (as per instant claims 96 and 110), then the bypass diode above it reads on the instant etch stop layer. Alternatively, with respect to claim 97 and 107 when the GaAs Cap N^{++} layer is considered the lateral conduction layer, then the GaAs P^{++} layer reads on the instant etch stop layer.

With respect to claim 98, and as clearly seen in said Figure 8, the Ge substrate (802) forms an electrical connection path between the multijunction solar cell and the bypass diode.

In an alternative with respect to claim 107, the N and P GaAs layers (804) and N and P GaInP layers (806) encompass the instant first region, and the bypass diode (810) encompasses the instant second sequence of layers.

Since Boutros et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

15. Claims 47, 48, 65, 66, 68, 69, 86, 87, 89-91, 93, 95, 97-101, 103, 104, and 106-108 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 9-64397, herein referred to as JP '397.

JP '397's solar module in Figure 2 comprises a conductive substrate (203); a multijunction solar cell (201) having first (204A, 205A, 206A) and second (204B, 205B, 206B) subcells formed on a first portion of the substrate; bypass diode (202) formed on a second portion of the substrate (203) having p-type, i-type and n-type layers (205A, 204B, 207D); and metal contact layers (208, 208D) (see also paragraphs 0031 to 0045). As seen in Figure 2, the bypass diode (202) is clearly integral with and laterally spaced apart from both the first and second subcells. JP '397's multijunction solar cell and bypass diode form an integral semiconductor body on the substrate (103). With respect to independent claims 47 and 90, the top layer (104A) of the top cell in Figure 1 can be p-type, and the bottom layer (104D) of the bypass diode can also be p-type (see paragraphs 0033, 0034, and Example 2 where a pinpin structure is used for the multijunction solar cell, i.e., layer 104A is p-type, and the bypass diode is ip structure, i.e., layer 104D is p-type). With further respect to claims 47 and 90, Figure 2 of JP '397 shows lateral separation of the second region from the first region through protective coating 210. In addition, regarding claim 47, a sequence of layers in the second and first regions are shown to be identical. (Figure 1; 107D/108D and 107/108) With respect to claim 93, JP '297's conductive substrate (103) in Figure 1 reads on the instant planar lateral conduction layer. With respect to claim 100, JP '397's Figures 1 and 2 anticipate

this claim because a "corresponding" sequence encompasses the situation in these figures. In particular, each layer in the bypass diode has a "corresponding" layer in the multijunction solar cell in said figures. With respect to claim 107, as seen in JP '397's Figure 3, there is a substrate (303) that has a sequence of semiconductor layers, the lower portion of the sequence, i.e., layers (304A) to (306B) that forms the multijunction solar cell, and the upper portion of the sequence, i.e., layers (350D, 304D) that forms the bypass diode. In said Figure 2, conductive layer 308 reads on the instant highly conductive layer.

With respect to claims 48 and 91, as clearly seen in Figure 2, the sequence of layers of the subcells and the sequence of layers of the bypass diode would clearly be grown in the same process step.

With respect to claims 65, 86, 99, and 108, the metal lead wire (209,309) together with the metal contact (208D,308D) read on the instant metal contact.

With respect to claims 66, 93, 100, and 107, the substrate (303) is also a lateral conduction layer. With respect to claim 95 and in the alternative, the lateral conduction layer can be considered to be semiconductor layer (304A), which is doped either n-type or p-type (see paragraph 0025).

With respect to claim 68 and 97, any of the layers (304A to 307) above the substrate (303), or any of the layers (305A to 307) above layer (304A) reads on the instant stop etch layer.

With respect to claim 89, as clearly seen in Figure 3, the sequence of layers of the subcells and the sequence of layers of the bypass diode would clearly be grown in a different, subsequent process step.

Since JP '397 teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

16. Claims 47-57, 59, 61, 65-68, 70, and 86-111 are rejected under 35 U.S.C. 102(b) as being anticipated by Ho et al, WO 99/62125. In particular, see Figures 12 and 14B, and page 8, lines 16-23, which teach the claimed invention.

Ho et al's multijunction solar cell has a first portion at the left having a first GaAs subcell (1412-1416) and a second GaInP subcell (1422-1426); and a second portion laterally spaced apart from the first portion by a trough and including bypass diode (1410) that is integral with said first subcell (see Figure 14B; and page 8, lines 18-23). The diode (1410) includes a metal/semiconductor contact comprising front metal contact (1440), which, it is the Examiner's position, forms a Schottky junction with the tunnel diode layer N^{++}. The solar cell has a Ge substrate (1402-1404) (see Figure 14B). The combination of Ho et al's metal contact (1436) and front metal contact (1440) reads on the instant metal layer. The tunnel diode layers (1418) and (1420) in both said first and second portions in said Figure 14B read on the instant lateral conduction layer. As seen in Ho et al's Figure 14B, the topmost layer of the topmost cell is n-type Ge substrate (1402) which is of the same polarity as the bottom n^{++} tunnel diode layer (1420) of the bypass diode (1410). With respect to claim 50, the bypass diode and the

GaAs subcell have the same sequence of layers and the same composition and thickness, as seen in said Figure 14B. With respect to claims 47, 50, 86, and 93, said Figure 14B clearly has first and second portions, the first portion having the solar cells, and the second portion having the overlying bypass diode (1410), with the portions being laterally separated and spaced apart. With respect to claim 93, the front metal contact (1440) in said Figure 14B reads on the instant planar lateral conduction layer. With respect to claim 100, as seen in said Figure 14B, front metal (1436) is a lateral conduction layer that is physically separated from front metal (1440), which is another lateral conduction layer. With respect to claim 107, see Ho et al's Figure 12, where there is a cascade solar cell at a lower portion, a bypass diode (1214, 1216) at an upper portion, GaAs connecting layer (1210) which reads on the instant highly conductive lateral conduction layer, and layer (1222) which corresponds to the metal layer in instant claim 108 (see also page 7, line 16). The solar cell can be multijunction (see page 5, lines 15-20). Since Ho et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claims 65-68, 70, 86-89, and 93-111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boutros et al (U.S. Patent 6,635,507) in view of Ho et al (WO 99/62125).

As seen in Figure 8, and with respect to independent claims 65, 86, 93 and 107, Boutros et al teaches a multijunction solar cell comprising a Ge substrate (802); a first region including the N and P GaAs layers (804) which form a first junction of the

multijunction solar cell and the N and P GaInP layers (806) which form a second junction of the multijunction solar cell, wherein this first region includes the portion of said N and P GaAs layers (804) and the portion of the N and P GaInP layers (806) not directly below, but to the right of the GaAs cap layer. In a second region, the portions of corresponding N and P GaAs layers (804) and N and P GaInP layers (806) directly below the GaAs Cap support the bypass diode (810) to protect the cell against reverse biasing (see also col. 1, lines 16-22; and col. 7, lines 47-65). With respect to claims 66, 68, 70, 97, 107, when the GaAs P^{++} layer is considered the lateral conduction layer, then the bypass diode above it reads on the instant etch stop layer. Alternatively, with respect to claims 97 and 107 when the GaAs Cap N^{++} layer is considered the lateral conduction layer, then the GaAs P^{++} layer reads on the instant etch stop layer. As seen in Figure 8, there is a connecting electrical contact (816) deposited on a portion of the substrate (802) and over a portion of the bypass diode (i.e., over a portion of the second region). Clearly, this electrical contact is for shorting the multijunction solar cell (in both regions) and to electrically connect to said bypass diode in the second region.

With respect to the independent claims, these claims require that the top layer of the top cell has a first polarity and that the bottom layer of the bypass diode has the first polarity. In Figure 8, it is the Examiner's position that the GaAs N^{++} layer can be considered to by the lower layer of the bypass diode, and thus, has the same polarity as the upper N-type GaInP layer of the upper solar cell. Indeed, as seen in Boutros et al's Figures 2A, 3A, and 4A, the bottom layer of the bypass diode (210, 310, 410) is N^{++} and is the same polarity, i.e., N-type, as the top layer (208, 308, 408) of the solar cell.

With respect to claims 48 and 91, when Boutros et al's sequential deposition steps (col. 8, lines 4-46) are considered a growth step, then the layers of the multijunction solar cell and bypass diode are grow sequentially in the same process step, i.e., the process step is the sequential growth of the layers. After the growth step, there is etching (see col. 8, lines 37-46).

With respect to claim 89, and in an alternative with respect to the immediately preceding, the first and second solar cells (804,806) can be considered to be grown in a first process, and then the bypass diode (810) can be considered to be grown in a second process after the first process.

With respect to claim 88, there is a trough between Boutros et al's bypass (810) and the contact (818), and thus, there is a trough between first and second portions as here claimed.

With respect to claims 93, 94, 100, and 109, Boutros et al's contact (818) reads on the instant planar lateral conduction layer deposited over the sequence of layers in the second region. The uppermost GaAs cap of the bypass diode reads on the lateral conduction layer in the first region that is separated from the lateral conduction layer in the first region.

With respect to claim 98, and as clearly seen in said Figure 8, the Ge substrate (802) forms an electrical connection path between the multijunction solar cell and the bypass diode.

Boutros et al teaches the limitations of the instant claims other than the difference which is discussed below

With respect to claims 65 and 86 (and their dependent claims), and also with respect to claims 99 and 108, Boutros et al does not specifically teach that said connecting contact (816) can be made from metal (i.e., instant metal layer). However, as shown by reference sign (1436) in Figure 14B of Ho et al, it is well-known and conventional in the solar cell art to form connecting solar cell contacts from metal (see also page 8, lines 18-23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Boutros et al's connecting contact (816) from metal because it is well-known and conventional in the art to do so, as shown by Ho et al.

Response to Arguments

21. Applicant's arguments filed 21 December 2006 have been fully considered but they are not persuasive.

Regarding the rejections made under 35 U.S.C. §112, 1st paragraph, Applicant reiterates arguments for support for the term "substantially", and argues that the Examiner has not met the burden for maintaining the rejection. The Examiner's position remains that there is simply no support for the broadening term "substantially" in the specification as filed, and no amount of argument will provide such support. Slight variations in thickness and composition are of course inherently present in any deposited film, and any skilled artisan reading the specification will recognize that the layers described will have such variation. However, this does not justify introduction of the unsupported term "substantially". This term opens the claim language to

interpretation that is very clearly absent from the originally filed specification. If "substantially the same composition and thickness" is supported, then why wouldn't "approximately the same composition and thickness", or "similar composition and thickness"? Applicant's arguments and declaration equally apply to these broader limitations. Addition of such broadening terms unambiguously constitutes addition of new matter, and the rejection is properly maintained.

With regard to the rejections under 35 U.S.C. §112, 2nd paragraph, Applicant argues that the claim language is clear, as "substantially the same thickness" corresponds to normal variations of up to two to three percent in composition and thickness of a compound semiconductor layer, citing Applicant's declaration. At the outset, the Examiner notes that there is no description of such "normal variations" in the specification as filed, and the designation of two to three percent variation in a declaration does not render the claim language definite. It is not clear how close to having the same thickness the corresponding layers must have in order to be considered to have "substantially the same thickness". There is no basis in the specification as filed for interpretation of the unsupported term "substantially", and the claims are therefore not properly defined.

Regarding claim 47, Applicant argues that the JP '397 reference does not disclose an identical sequence of layers as claimed. Applicant is in error. Figure 1 of JP '397 shows a sequence of layers in the second and first regions that are identical. (Figure 1; 107D/108D and 107/108) The claim language clearly does not require that

"an identical sequence of layers" recited in line 9 of the claim be the same as "a sequence of layers" recited earlier in the claim.

Further, regarding claim 47, Applicant argues that Ho et al do not teach that the separated sequence of layers form a support for the bypass diode as claimed. Applicant is in error. At minimum, the separate AlGaAs window, GaAs emitter, and GaAs Base/Buffer layers shown within structure 1410 of Figure 14B of Ho et al meet this limitation, as they clearly form a support for the diode layers above them (i.e. Schottky diode formed at metal/tunnel diode interface.

Regarding the Ho reference, Applicant argues that the Office Action improperly asserts that the Ge substrate 1402 corresponds to the "top layer of a top subcell" and the claimed "substrate". The Examiner points out in response that no recitation in the claims precludes such interpretation. In claim 65, there is no relationship explicitly required between "the top cell" and any previously recited "sequence of layers" or "at least one cell".

For the numerous other independent claims, Applicant provides generic arguments that the prior art does not teach the claimed structure for the same reasons, as addressed above. The Examiner maintains that the limitations of the claims are taught by the references, as discussed in the rejections and arguments above.

Conclusion

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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